Instructions for using the HIGH SENSITIVITY LOW-MU PERMEABILITY INDICATOR

SEV-ENG-96040.1

The High Sensitivity Low-Mu Permeability Indicator is a simple-to-operate device to be used for indicating the relative permeability of low permeability materials.

The operation of the Indicator is based on the mutual attraction of a permanent bar magnet for a calibrated insert and an unknown material. In use, an insert is screwed into the top of the case. The magnet is then attracted to the insert by a force dependent upon the insert's permeability. The end of the magnet projecting from the opening in the bottom of the case is then brought into contact with the material being tested. It is *essential that the contact surface be clean* and free from oxide scale or foreign material. The Indicator is then moved away in a direction perpendicular to the contact surface. If the material being tested has a higher permeability than that of the calibrated insert, then the magnet will completely separate from the bottom of the insert as the Indicator is moved away. A complete separation occurs when the metal collar holding the magnet strikes the bottom of the plastic case. If the permeability of the material being tested is *lower* than that of the insert value, the magnet *will first separate from the test material* as the Indicator is moved away. Thus, by interchanging the inserts, it is possible to determine the permeability of the material between the values of two inserts. The Indicator does not determine a single exact value for the permeability of the material; it determines a permeability range. The tolerance limits for each insert is specified on the back of the Certificate of Calibration.

Two features of the Indicator deserve special mention. First, the balanced beam to which the magnet is attached permits the use of the Indicator in all positions without correction due to gravity. Secondly, the hemispherical magnet ends provide point contact with the inserts and the test materials.

Test Specimens: The test specimen is recommended to have a minimum area of 1 cm^2 [100mm^2] and a minimum thickness of 0.3 cm [3mm]. The specimen may be laminated. Test specimens having a volume in excess of the minimum value quoted above may be in any form, shape or condition (for example, castings, forgings, bars, weld beads, etc.) The indicator may be placed on any location on the specimen to be tested provided the surface is suitably flat and in full contact with the magnet. The Indicator is capable of detecting surface permeability differences, if present, of large objects.

Background Magnetic Field: The Indicator should not be used in an environment where the background magnetic field strength exceeds 1mT.

The High Sensitivity Low-Mu Permeability Indicator must be handled with care. **Do not adjust** the nuts on the Indicator. It will affect the accuracy of the measurements. Also, the following precautions should be observed:

1. Specimens to be tested should be **placed on a non-magnetic material** at least 2.0 cm thick.
2. **Remove** metal filings, chips and dirt from the surface of the material under test. Filings and dirt on the end of the magnet can be removed with masking tape.
3. **Under no circumstances** bring another magnet in contact with the Indicator magnet. This will disturb the calibration of the Indicator to such an extent that it will necessitate its return and subsequent recalibration.
4. Be sure inserts are screwed firmly in place so as to establish contact with the magnet.
5. Do not jerk the Indicator away from the test material, especially with the 1.01 insert in place. This will tend to give a false indication.
6. **Avoid** as much as possible contacting the Indicator with **strongly magnetic materials** such as steel, cast iron, or straight chromium steels. The tip of the permanent magnet extending from the plastic case should never come within 2.0 cm of a highly magnetic material such as ferritic steel, iron or nickel. This can be accomplished by first screening the materials under test with a hand magnet.
7. **Do not drop the Indicator**. Do not expose to temperatures below -18^0 or above 48^0 Centigrade.
8. Inserts are **not** interchangeable between Indicators.
9. When not in use keep the Indicator in its box with the **highest value insert** in place in the Indicator.
10. **Storage Requirements**: If the instrument is to be stored in a standard steel cabinet, place it in its wooden box and place a non-magnetic material such as plastic, wood, or urethane foam at least 2.0 cm thick between the wooden box and the steel shelf.
11. The Indicator needs recalibration on a yearly basis to maintain measurement accuracy.

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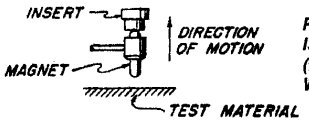
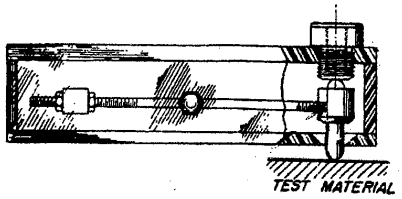
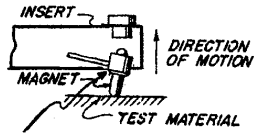
READ BEFORE USE



PERMEABILITY VALUE OF TEST MATERIAL IS LOWER THAN THAT OF INSERT (MAGNET REMAINS IN CONTACT WITH INSERT)



PERMEABILITY VALUE OF TEST MATERIAL IS HIGHER THAN THAT OF INSERT (MAGNET REMAINS IN CONTACT WITH TEST MATERIAL



MAGNET COLLAR SHOULD TOUCH PLASTIC CASE